Retrospective study of the incidence of amyloidosis in wild ruminants in the Zoo of Barcelona

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Introduction

AA amyloidosis is a systemic amyloidosis with SAA as the precursor protein, observed in various animal species including humans. The most affected organs in animals are the liver, spleen and kidney (Fig. 3 and 4).

Similarly to prion disease, AA amyloidosis is considered to be transmitted via a "seeding-nucleation" process (Fig .1).

Aim

This manuscript will be a literature review of transmissible amyloidosis described in bovine, different species of birds and cheetahs, and it will consider whether this process can occur also in some wild ruminants such as *Dorcas Gazelle.*

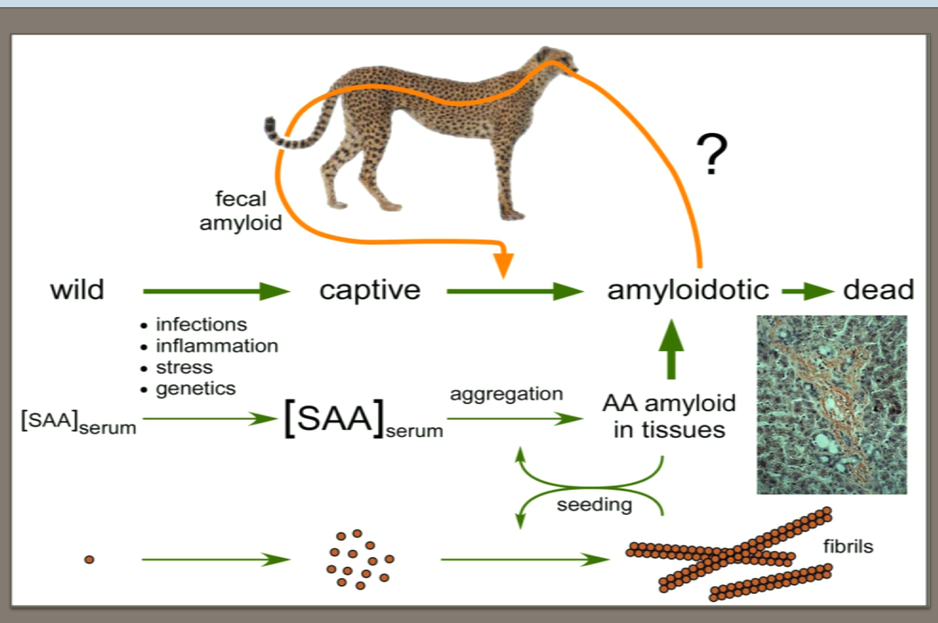

Diagram of AA amyloid formation and the potential prion-like transmission of AA amyloidosis by fecal shedding and oral uptake of the amyloid (Caughey, B. i Baron, G., 2008).

Transmission of AA amyloidosis

The first evidence of transmission of amyloidosis was seen in mice, in which was seen an acceleration in the emergence of amyloidosis by the inoculation of amyloid fibrils, which act as amyloid enhancing factor.
Since then, the species which has been shown transmission of amyloidosis by experimental mice models are shown in Table 1 . (Murakami T., et al. 2014)

Donor species	Recipient species
Human	Mouse
Mouse	Mouse
Bovine	Mouse
	Rabbit
Fowls	Fowls
	Mouse
Cheetah	Mouse
Cat	Mouse
Mink	Mink

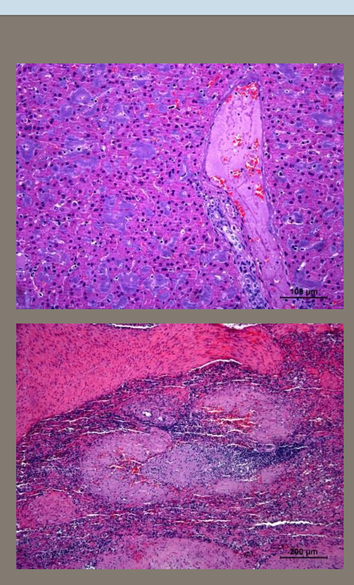

Fig. 3. Histological sections of liver (top) and spleen (below) with amyloid deposits (HE x 20)

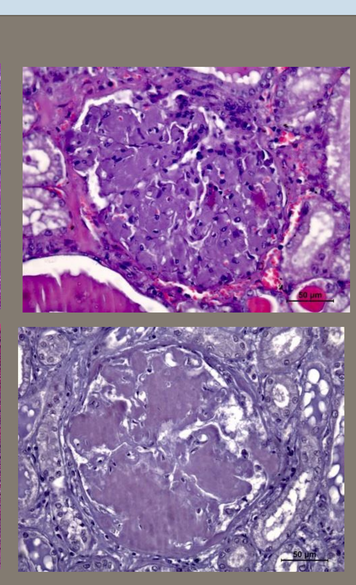

Fig. 4. Histological sections of kidney with amyloid deposits . HE x 40 (top) and RC x 40 (below)

Amyloidosis in wild ruminants in the Zoo of Barcelona

The emergence of clusters of AA amyloidosis in some centers of *Dorcas Gazelles* in Europe suggested that may have been transmitted, as happens in other species. After reviewing the incidence of amyloidosis in ruminants of the Zoo of Barcelona, only sporadic cases have occurred.

Some aspects that reinforce the hypothesis of transmissibility are reported cases in literature in which amyloid deposits without any underlying cause are observed in death animals.

Moreover, the fact that it has proven transmissibility in other animals of gazelles family *(Bovidae)* and other wild animals in captivity (cheetah) supports the suspicion of transmissibility.

Conclusions

1. **The possibility of transmission of amyloidosis by a mechanism similar to the prion nucleation has been demonstrated.**
2. **To check the hypothesis of transmission of amyloidosis in gazelles, would be necessary to consider a sampling of all the dead animals and an epidemiological study of the mortality, and consider experimental studies with animal models in the future.**
3. **From the point of view of conservation of species, the discovery of transmissible amyloidosis represents a change in the perception of this disease.**

Bibliography

- Caughey, B. and Baron, G. 2008. Are the cheetahs on the run from the prion-like amyloidosis? PNAS. 105 (20): 7113-7114.
- Shirahama, T., Lawless, O.J. and Cohen, A.S. 1969 Heterologous transfer of amyloid –human to mouse. Proc. Soc. Exp. Biol. Med. 130: 516–519.